

because no other non-metals are disclosed. Claim 2 is similarly rejected for reciting "a non-metal comprising Si." The reasons for rejection of claim 1 also apply to claim 5.

Applicants amend claims 1, 2 and 5 to remove reference to "nonmetallic oxide comprising Si." Applicants respectfully request withdrawal of the rejection of claims 1, 2 and 5. Claims 3, 4 and 6-8 depend from these claims and so were rejected. With removal of the rejected language, Applicants also respectfully request withdrawal of the rejection of claims 3, 4 and 6-8.

35 U.S.C. §112, Second Paragraph - Claims 1-5

The Patent Office rejects claims 1-5 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. More particularly, the Patent Office points to claim 1 for reciting "the metallic oxide being selected from the group consisting of Mg, Al, Co..." for those elements not being oxides.

The Applicants have amended claim 1 to clarify the invention as recited. Namely, the Applicants have clarified that "a metal of the metallic oxide being selected from..." (Emphasis added) (Amended claim 1) Applicants request withdrawal of the rejection of claim 1 based on this point. Claims 2-4 are rejected based on the claim 1 rejection. Applicants respectfully request withdrawal of the rejection of claims 2-4 based on this point.

The Patent Office includes claim 5 in this rejection, but does not provide a basis for the rejection. Applicants are unable to determine the basis for the rejection and so respectfully request either a withdrawal of the rejection or some indication of the reasoning.

35 U.S.C. §102(e) - Claims 1, 2 and 4

The Patent Office rejects claims 1, 2 and 4 under 35 U.S.C. §102(e) as being anticipated by Goda, et al., U.S. Patent No. 6,004,695 ("Goda"). The Patent Office refers Applicants to the Office Action of March 29, 2001 for the reasons for rejection.

Applicants have amended claims 1 and 2 to remove reference to silicon. Applicants request withdrawal of the rejection of claims 1 and 2. Claim 4 depends from claim 1 and so contains all the limitations of that claim. For at least the reason stated regarding claim 1, Applicants also request withdrawal of the rejection of claim 4.

35 U.S.C. §103(a)- claims 3 and 5-8

The Patent Office rejects claims 3 and 5-8 under 35 U.S.C. §103(a) as being unpatentable over Goda. The Patent Office states that Goda teaches that silicon oxide is preferred as the oxide for surface treatment. More particularly, the Patent Office states that Goda does not explicitly teach the coating is formed from an alkoxide solution.

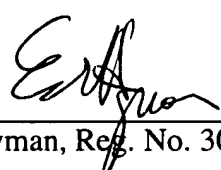
Applicants have amended claims 1 and 5. Reference to silicon has been removed. Applicants request withdrawal of the rejection of claims 3 and 5. Claims 6-8 depend from claim 5 and contain all of its limitations. For at least the reason stated for claim 5, Applicants request withdrawal of the rejection of claims 6-8.

CONCLUSION

In view of the foregoing, it is submitted that claims 1-8 patentably define the subject invention over the cited references of record, and are in condition for allowance and such action is earnestly solicited at the earliest possible date. If the Examiner believes a telephone conference would be useful in moving the case forward, she is encouraged to contact the undersigned at (310) 207-3800.

Respectfully submitted,
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Dated: March 6, 2002

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on March 6, 2002.


Margaux Rodriguez March 6, 2002

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

Please replace the paragraph on page 4, line 4, beginning with "Thereafter, the powder is coated with" as follows:

Thereafter, the powder is coated with an [metallic or non-metallic] alkoxide solution. The alkoxide solution is formed by the reaction of an alcohol with a metal [or non-metal] being 1 to 50 weight percent of the alcohol. The metal [or non-metal] may be preferably selected from Mg, Al, Co, K, Na, Ca, [Si,] Ti or Sr. More preferably, the metal [or non-metal] is selected from Ai, Mg, Ti or Al. An alternative alkoxide is a silicon alkoxide formed by a reaction of an alcohol with silicon. The alcohol is preferably selected from methanol or ethanol. When the metal or [non-metal]silicon is less than 1 weight percent of the alcohol, the coating effect of the metallic alkoxide solution onto the powder is not induced. In contrast, when the metal or [non-metal]silicon is more than 50 weight percent of the alcohol, the coating layer of the metallic alkoxide solution becomes undesirably thick. A sputtering technique, a chemical vapor deposition (CVD) technique, a dip coating technique and other general-purpose coating techniques may be employed for the coating use. Among the techniques, the dip coating technique may be preferably used for coating the [metallic or non-metallic] alkoxide solution onto the powder.

Please replace the paragraph on page 4, line 18, beginning with "The alkoxide-coated powder is" as follows:

The alkoxide-coated powder is then dried at 120°C for about 5 hours in an oven. The drying step is to uniformly distribute lithium salts in the powder. Thereafter, the dried powder is heat-treated at temperatures ranged from 200 to 1000°C for 1 to 20 hours under an oxidation atmosphere where dry air or oxygen is blowing. When the heat-treating temperature is lower than 200°C, the metallic or [non-metallic]silicon alkoxide solution coated on the powder is not crystallized so that it prohibits free movement of lithium ions in the active material. It is preferable that the heat-treating step is performed at temperatures ranged from 300 to 900°C for 1 to 10 hours. This heat-treating operation makes the metallic or [non-metallic]silicon alkoxide to be changed into [a metallic]an oxide. In this way, a metallic or [non-metallic]silicon oxide-coated active material is prepared.

Please replace the paragraph on page 5, line 6, beginning with "The metallic oxide formed on the surface" as follows:

The metallic or [non-metallic]silicon oxide formed on the surface of the power may be derived from the single metallic or [non-metallic]silicon alkoxide source or the composite sources of manganese of lithiated transition metal compound and metallic or non-metallic alkoxide. The thickness of the metallic oxide layer reaches up to 1 to 100nm and the quantity of metal content is ranged from 1.0 to 10 weight percent of the metallic oxide.

IN THE CLAIMS

The claims have been amended as follows:

1. (Three Times Amended) A positive active material for rechargeable lithium batteries, the positive active material comprising:

an active material component processed from a manganese-based compound, the manganese-based compound being selected from the group consisting of Li_xMnO_2 , Li_xMnF_2 , Li_xMnS_2 , $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_2$, $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_{2-z}\text{F}_z$, $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_{2-z}\text{S}_z$, $\text{Li}_x\text{Mn}_2\text{O}_4$, $\text{Li}_x\text{Mn}_2\text{F}_4$, $\text{Li}_x\text{Mn}_2\text{S}_4$, $\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{O}_4$, $\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{O}_{4-z}\text{F}_z$, and $\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{O}_{4-z}\text{S}_z$, where $0 < x < 1.5$, $0.05 \leq y \leq 0.3$, $z \leq 1.0$ and M is selected from the group consisting of Al, Co, Cr, Mg, Fe and La; and

a metallic oxide [or non-metallic oxide] coated on the active material component, the metallic oxide [being]comprising a metal selected from the group consisting of Mg, Al, Co, K, Na, Ca, Ti and Sr[, and the non-metallic oxide comprising Si].

2. (Three Times Amended) The positive active material of claim 1 wherein the metallic oxide has a metal selected from the group consisting of Mg, Ti and Al[, and the non-metallic oxide has a non-metal comprising Si].

5. (Three Times Amended) A method of preparing a positive active material for rechargeable lithium batteries, the method comprising the steps of:

obtaining a powder from a source material, the source material being selected from the group consisting of Li_xMnO_2 , Li_xMnF_2 , Li_xMnS_2 , $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_2$, $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_{2-z}\text{F}_z$, $\text{Li}_x\text{Mn}_{1-y}\text{M}_y\text{O}_{2-z}\text{S}_z$, $\text{Li}_x\text{Mn}_2\text{O}_4$, $\text{Li}_x\text{Mn}_2\text{F}_4$, $\text{Li}_x\text{Mn}_2\text{S}_4$, $\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{O}_4$, $\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{O}_{4-z}\text{F}_z$, and $\text{Li}_x\text{Mn}_{2-y}\text{M}_y\text{O}_{4-z}\text{S}_z$, where $0 < x < 1.5$, $0.05 \leq y \leq 0.3$, $z \leq 1.0$ and M is selected from the group consisting of Al, Co, Cr, Mg, Fe and La; and

coating the powder with a metallic alkoxide solution [or a non-metallic alkoxide solution] to make an alkoxide-coated powder, the metallic alkoxide solution being selected from the group

consisting of Mg-Alkoxide, Al-alkoxide, Co-alkoxide, K-alkoxide, Na-alkoxide, Ca-alkoxide, Ti-alkoxide and Sr-alkoxide[, and the non-metallic alkoxide solution comprising Si-alkoxide]; and

heat-treating the alkoxide-coated powder such that the alkoxide-coated powder is changed into an oxide-coated powder.